Assignment - 4

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Simple linear regression

Sample(i)	x^a	y^b
1	7.6	157
2	7.1	174

Step-1: Read dataset, $\eta = 0.01$, epochs = 1, $m = 1$, $c = -1$

Step 2: set iteration = 1

Step 3: set sample $i = 1$

Step 4: $Y = mx + c$

$y = 1)(7.6) - 1 = 6.6$

Step 5: $E = \frac{1}{2}(y_i^a - mx_i^a + c)^2$

$E = \frac{1}{2}(157 - (1)(7.6) - (-1))^2$

$= \frac{22620.16}{2} = 11310.08$

Step 6: $\frac{\partial E}{\partial m} = -(y_i^a - mx_i^a - c)\, x_i^a$

$= -(157 - 6.6)(7.6) = -1143.04$

$\frac{\partial E}{\partial c} = -(y_i^a - mx_i^a - c) = -(157 - 6.6) = -150.4$

Step 7: $\Delta m = -\eta \frac{\partial E}{\partial m} = -(0.01)(-1143.04)$

$= 11.4304$

$\Delta c = -\eta \frac{\partial E}{\partial c} = -(0.1)(-150.4) = 1.504$

Step-8: $m = m + \Delta m = -1 + 11.4304 = 10.4304$

$c = c + \Delta c = -1 + 1.504 = 0.504$

Step 9: Sample $i = i + 1 = 2$ & $i \leq ns \rightarrow$ step (4)

Step-4: $Y = (12.5304)(7.1) + 0.504$

$= y = 89.469$

Step-5: $E = \frac{1}{2}(174 - 89.469)^2$

$= 7147.011$

Step-6: $\frac{\partial E}{\partial m} = -(174 - (12.5304)(7.1) - (0.504))7.1$

$= 600.164$

$\frac{\partial E}{\partial m} = 600.164$

Step-7: $\Delta m = -\eta \frac{\partial E}{\partial m} = -(0.01)(600.164)$

$= -(0.01)(7147.011)$

$= -71.47$

$\Delta c = -\eta \frac{\partial E}{\partial c} = -(0.01)(600.164) = -6.001$

Step 8:- $m = 12.4304 + (-71.47) = -58.9796$

$c = 0.5404 + (-6.001) = -58.9796$

Step 9:- Sample $i = i+1 = 2+1 = 3$ $i_3 \leq n$, s T → next step

Step-10:- iter = iter+1 = 1+1 = 2 $iter_2 >$ epochs

T → next step

Step 11:- Stop.